I (WE) CLAIM:

1. In a method for automatic optimization in color Doppler velocity imaging, an improvement comprising:

(a) applying multidimensional phase unwrapping to a set of velocity data representing a multidimensional region.

2. The method of Claim 1 further comprising:

(b) setting one of a velocity scale, baseline, a parameter for auto-Doppler tracking, a persistence parameter, a spatial filter parameter, a threshold, a clutter filter parameter, and an imaging frequency as a function of results of (a).

3. The method of Claim 2 wherein (b) comprises:

(b1) determining a histogram of unwrapped velocities of the set of velocity data; and

(b2) selecting the velocity scale as a function of a distribution of the histogram.

4. The method of Claim 1 wherein (a) comprises determining a two dimensional phase unwrapping to each value of the set of velocity data, the multidimensional region being an area.

5. The method of Claim 1 wherein (a) comprises determining a three dimensional phase unwrapping to each value of the set of velocity data, the multidimensional region being a volume.

6. The method of Claim 1 wherein (a) comprises:

(a1) determining a multidimensional closed path with the gradient of the phase integrating to zero; and

(a2) determining a phase for a plurality of locations along the multidimensional path.

7. The method of Claim 6 wherein (a1) comprises selecting phase residues along the multidimensional path of opposite values.

8. The method of Claim 1 further comprising:

(c) setting thresholds as a function of the results of (a) and a measure of clutter.

9. The method of Claim 1 further comprising:

(c) identifying the set of velocity data prior to (a) as associated with a systole period of a heart cycle.

10. The method of Claim 1 further comprising:

(b) setting the velocity scale as a function of the results of (a); and

(c) performing (b) as a function of the results and a user aliasing selection.

11. The method of Claim 2 wherein (b) comprises setting the imaging frequency as a function of the results of (a), the imaging frequency being for flow imaging.

12. The method of Claim 11 wherein (b) comprises:

(b1) determining a correlation as a function of depth between two frames of velocity data, one of the frames of velocity data being a function of the results of (a); and

(b2) reducing the imaging frequency in response to a decrease in the correlation at greater depths.

13. A system for automatic optimization in velocity imaging, the system having at least one processor operable to implement acts (a) and (b) of Claim 2.

14. A method for automatic optimization of thresholds for color Doppler imaging, the method comprising:

(a) determining a clutter level as a function of energy input to and energy output from a clutter filter; and

(b) selecting a threshold as a function of the clutter level. (Rob's contribution)

15. The method of Claim 14 wherein (a) comprises dividing or subtracting the energy input by the energy output.

16. The method of Claim 14 wherein (b) comprises selecting one of an energy input threshold, an energy output threshold and a velocity threshold.

17. The method of Claim 14 wherein (b) comprises selecting the threshold as a function of the clutter level, energy output and velocity.

18. The method of Claim 16 wherein (b) comprises selecting each of the energy input threshold, the energy output threshold and the velocity threshold as a function of the clutter level, energy output and velocity.

19. The method of Claim 14 wherein (b) comprises selecting the threshold for a first region and an additional threshold of a same type for a second region different than the first region.

20. The method of Claim 16 wherein (b) comprises selecting at least two of the energy input threshold, the energy output threshold and the velocity threshold as a function of the clutter level.

21. The method of Claim 16 wherein (b) comprises selecting one of the energy input and energy output thresholds.

22. The method of Claim 16 further comprising:

(c) identifying the clutter level as high and a velocity as low; and

(d) selecting a clutter filter as a complex notch filter as a function of the identification of (c).

23. The method of Claim 17 further comprising:

(c) applying multidimensional phase unwrapping to a set of velocity data representing a multidimensional region;

wherein (b) comprises selecting as a function of the velocity, the velocity being from results of (c).

24. The method of Claim 14 further comprising:

(c) applying multidimensional phase unwrapping to a set of velocity data representing a multidimensional region; and

(d) setting an imaging frequency as a function of results of (a).

25. A system for automatic optimization of thresholds for velocity imaging, the system comprising a processor operable to perform the acts of Claim 14.

26. A method for automatic optimization in velocity imaging, the method comprising:

(a) determining a correlation as a function of depth between two sets of velocity data; and

(b) altering an imaging frequency as a function of the correlation.

27. The method of Claim 26 further comprising:

(c) identifying the two sets of velocity data as frames of data associated with a peak systole period.

28. The method of Claim 26 wherein (b) comprises decreasing the imaging frequency where the correlation decreases for greater depths.

29. The method of Claim 26 further comprising:

(c) detecting a displacement in an imaging region; and

(d) triggering (a) and (b) in response to (c).

30. The method of Claim 1 further comprising:

(c) detecting a displacement in an imaging region; and

(d) triggering (a) and (b) in response to (c).

31. The method of Claim 14 further comprising:

(c) detecting a displacement in an imaging region; and

(d) triggering (a) and (b) in response to (c).

32. A method for automatic optimization of an ultrasound imaging parameter, the method comprising:

(a) detecting a displacement associated with an imaging region; and

(b) automatically updating an imaging parameter selected from the group of: a flow imaging parameter, a velocity scale, a velocity threshold, an energy threshold, an imaging frequency, a beamforming parameter, a persistence value, spatial filter value and combinations thereof in response to (a).

33. The method of Claim 32 wherein (b) comprises:

(b1) applying multidimensional phase unwrapping to a set of velocity data representing a multidimensional region; and

(b2) setting one of the velocity scale and the imaging frequency as a function of results of (b1).

34. The method of Claim 32 wherein (b) comprises:

(b1) determining a clutter level as a function of energy input to and energy output from a clutter filter; and

(b2) selecting one of the energy threshold and the velocity threshold as a function of the clutter level.

35. The method of Claim 32 wherein (a) comprises detecting one of: elevation, azimuth and range displacement in an azimuth and range imaging plane and wherein (b) comprises adaptively updating.

36. The method of Claim 32 wherein (a) comprises detecting the displacement from B-mode data representing a sub-region of the imaging region.

37. The method of Claim 36 wherein (b) comprises automatically updating the flow imaging parameter.

38. The method of Claim 32 wherein (a) comprises:

(a1) calculating a similarity; and

(a2) comparing one of the similarity and a value responsive to the similarity to a threshold.

39. The method of Claim 32 wherein (a) comprises:

(a1) identifying a feature; and

(a2) comparing the feature within a first image to the feature within a second image.

40. The method of Claim 32 wherein (a) comprises detecting a repositioning of a spectral Doppler gate.

41. The method of Claim 32 wherein (a) comprises detecting the displacement of an imaging plane from flow data.

42. A method for automatic optimization of an ultrasound imaging parameter, the method comprising:

(a) detecting a change with data of a first ultrasound imaging mode; and

(b) automatically updating an imaging parameter of a second ultrasound imaging mode different than the first ultrasound imaging mode in response to (a).

43. The method of Claim 42 wherein (a) comprises detecting a displacement of an imaging plane from one of B-mode and flow mode data, and (b) comprises automatically updating the imaging parameter of the other of the flow mode and the B-mode.

44. The method of Claim 42 wherein (b) comprises automatically updating the imaging parameter selected from the group of: a flow imaging parameter, a velocity scale, a velocity threshold, an energy threshold, an imaging frequency, a beamforming parameter, a persistence value, spatial filter value, edge enhancement value and combinations thereof in response to (a).

45. The method of Claim 42 wherein (a) detecting the change from data of the first mode selected from the group of: B-mode, color flow mode, contrast agent imaging mode, harmonic imaging mode, and Doppler mode.